

REMARKS

Claims 1 and 20 have been amended. Claims 1-40 are present in the application. In view of the foregoing amendments, and the remarks that follow, reconsideration is respectfully requested.

Compliance With 35 U.S.C. §112

The Office Action rejected Claims 1-40 under the second paragraph of 35 U.S.C. §112 as indefinite, asserting that:

[Claims 1 and 20] recite free of oxygen gas in the chemistry of the plasma. However, there are dielectric materials which are claimed that have oxygen in the composition. When etching the [dielectric, the] oxygen will be released and thus [will be] part of the plasma chemistry.

In the semiconductor art, the term "plasma chemistry" is typically used to refer to the mixture of gases that is intentionally supplied to a chamber in order to form the basis for a plasma process, without regard to trace amounts of other gases that, during the plasma process, might happen to be released from the material that is subjected to the plasma. To the extent that Claims 1 and 20 each previously recited "a plasma etch having a chemistry that is free of oxygen gas (O₂)", it should be clear that the word "chemistry" referred to the intended mixture of gases, and expressly excluded trace amounts of oxygen emitted in the form of etch byproducts. Moreover, MPEP §2173.02 explains that an examiner:

. . . should allow claims which define the patentable subject matter with a reasonable degree of particularity and distinctness. Some latitude in the manner of expression and the aptness of terms

should be permitted even though the claim language is not as precise as the examiner might desire. (Underlining in original).

Applicants respectfully submit that, by reciting "a plasma etch having a chemistry that is free of oxygen gas (O₂)", Claims 1 and 20 each defined "the patentable subject matter with a reasonable degree of particularity and distinctness". It is believed that, contrary to the assertions in the Office Action, the release of trace amounts of oxygen as an etch byproduct does not necessarily make those trace amounts a meaningful component of the intended plasma chemistry. Consequently, it is believed that Claims 1 and 20, as previously presented, were definite under §112.

Nevertheless, to avoid any further question on this point, Claims 1 and 20 have each been amended to recite "a chemistry that includes a mixture of gases supplied to said chamber from externally thereof, said mixture of gases being free of oxygen gas (O₂)". Even assuming that trace amounts of oxygen are released by a dielectric as an etch byproduct, they would not fall within the definition of a plasma "chemistry" that now appears in each of Claims 1 and 20. The modifications made in Claims 1 and 20 do not alter the intended scope of either claim. It is respectfully submitted that Claims 1 and 20, as amended, are each definite and in compliance with the second paragraph of 35 U.S.C. §112, and notice to that effect is respectfully requested.

Independent Claim 1

Independent Claim 1 stands rejected under 35 U.S.C. §103 as obvious in view of a proposed combination of Yang U.S. Patent No. 6,451,647 and Ying U.S. Patent No. 6,436,838. This ground of rejection is respectfully traversed. The PTO specifies in MPEP §2142 that:

The examiner bears the initial burden of factually supporting any *prima facie* conclusion of obviousness. If the examiner does not produce a *prima facie* case, the applicant is under no obligation to submit evidence of nonobviousness.

Applicants respectfully submit that Yang and Ying fail to establish a *prima facie* case of obviousness under §103 with respect to Claim 1, for reasons discussed below.

THE PROPOSED COMBINATION DOESN'T TEACH THE CLAIMED SUBJECT MATTER

The provisions of MPEP §2142 specify with respect to §103 that:

To establish a *prima facie* case of obviousness . . . the prior art reference (or references when combined) must teach or suggest all the claim limitations. (Emphasis added).

The PTO considers this requirement to be important, as evidenced by the fact that this exact language appears not only in MPEP §2142, but also in other sections of the MPEP, including MPEP §706.02(j) and MPEP §2143. Applicants' Claim 1 includes a recitation of:

etching through said exposed portions of said high k dielectric layer in an etch chamber with a plasma etch having a chemistry that includes a mixture of gases supplied to said chamber from externally thereof, said mixture of gases being free of oxygen gas (O₂), and including an inert gas, BCl₃, and one or more fluorocarbon gases C_xH_yF_z, wherein x and z are integers and y is an integer or is 0, or CH₄.

It is respectfully submitted that these limitations from Claim 1 are not met by combining the indicated teachings from Yang and Ying. More specifically, Yang teaches plasma etching a high-k dielectric material with an externally-supplied mixture that includes:

1. Oxygen gas (O_2);
2. An inert gas; and
3. A fluorine-containing material.

Turning to Ying, the Office Action indicates that Ying teaches the use of barium trichloride, but Ying actually teaches the use of boron trichloride. In detail, Ying teaches performing a plasma etch on a barium strontium titanate (BST) material, using an externally-supplied mixture that includes:

1. Boron trichloride (BCl_3); and
2. A further gas (e.g. an inert gas or oxygen gas).

In lines 16-18 on page 3, the Office Action asserts that it would be obvious to extract barium trichloride from the plasma chemistry taught by Ying and then add it to the plasma chemistry of Yang. Doing this would result in a plasma chemistry that includes:

1. Boron trichloride (BCl_3 , from Ying);
2. Oxygen gas (O_2 , from Yang);
3. An inert gas (from Yang); and
4. A fluorine-containing material (from Yang).

As noted above, independent Claim 1 recites a plasma "chemistry that includes a mixture of gases supplied to said chamber from externally thereof, said mixture of gases being free of oxygen gas (O_2)". This is clearly different from the plasma resulting from the proposed combination of Yang and Ying (which includes oxygen gas intentionally supplied from externally of the chamber). In other words, even when the indicated teachings from Yang and Ying are combined in the proposed manner, they fail to satisfy the requirement of MPEP §2142 that the combined teachings must collectively "teach or suggest all the claim limitations" (emphasis added). Therefore, for this independent reason alone, it is respectfully submitted that Claim 1 is not obvious under §103 in view of Yang and Ying, and notice to that effect is respectfully requested.

NO VALID REASON IS GIVEN FOR MODIFYING YANG IN VIEW OF YING

The PTO recently issued a memo to examiners, a courtesy copy of which is attached. The memo concluded by emphasizing that:

. . . in formulating a rejection under 35 U.S.C. §103(a) based upon a combination of prior art elements, it remains necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed.

In lines 16-18 on page 3 of the Office Action, the Examiner asserts that the reason a person of ordinary skill would have been prompted to take boron trichloride (BCl_3) from the plasma of Ying and add it to the plasma of Yang is "to increase the selectivity of the etchant gases". In lines 38-40 of column 7 and lines 46-47 of column 8, Ying teaches that, with BCl_3 , the selectivity of PZT to TiN is very good. Aside from this, Ying does not appear to discuss how BCl_3 affects selectivity. Turning to Yang, it does not appear that Yang mentions etching of TiN, much less with respect to PZT. Since Yang does not appear to involve an issue of etching PZT with respect to TiN, it is not clear that adding BCl_3 to the plasma of Yang would "increase the selectivity of the etchant gases" in Yang. Accordingly, the Office Action does not actually offer any valid reason why a person with only ordinary skill in the art would be prompted to make the particular modification to Yang that is proposed by the Examiner.

In view of the comments above, it should be clear that the idea of modifying Yang in view of Ying is not coming from what was known before the present invention, but instead is necessarily coming from hindsight of Applicant's disclosure. In particular, using Applicant's disclosure as a blueprint, the Examiner has selectively extracted isolated features from both Yang and Ying, and has then combined these isolated features with a 20/20 hindsight view of the desired result. The Examiner has not identified any valid reason that would prompt such a modification.

As emphasized in the enclosed PTO memo, if a §103 rejection does not identify any valid reason that would prompt the proposed modification, then the rejection fails to meet one of the minimum requirements needed to properly establish a prima facie case of obviousness. In the present situation, it is respectfully submitted that there is no valid reason that would prompt a person of ordinary skill to make the proposed modification to Yang in view of Ying. Accordingly, the proposed modification would not be obvious under §103. Claim 1 is therefore believed to be allowable.

Independent Claim 20

Independent Claim 20 stands rejected under 35 U.S.C. §103 as obvious in view of a proposed combination of Yang and Ying. This ground of rejection is respectfully traversed. Claim 20 includes a recitation of:

etching through exposed portions of said high k dielectric layer in an etch chamber with a plasma etch having a chemistry that includes a mixture of gases supplied to said chamber from externally thereof, said mixture of gases being free of oxygen gas (O₂), and including an inert gas, BCl₃, and one or more fluorocarbon gases C_xH_yF_z, wherein x and z are integers and y is an integer or is 0, or CH₄.

The rationale given in the Office Action for the rejection of Claim 20 is identical to the rationale given for the rejection of Claim 1. Therefore, for the same basic reasons discussed above in association with Claim 1, it is respectfully submitted (1) that the proposed modification of Yang in view of Ying does not result in the particular plasma chemistry recited in Claim 20, and (2) that there is no valid reason that would prompt a person of ordinary skill in the art to make the

proposed modification to Yang in view of Ying. Accordingly, the proposed modification would not be obvious under §103. Claim 20 is therefore believed to be allowable.

Dependent Claims

Claims 2-19 and Claims 21-40 respectively depend from Claim 1 and Claim 20, and are also believed to be distinct from the art of record, for example for the same reasons discussed above with respect to Claims 1 and 20.

Conclusion

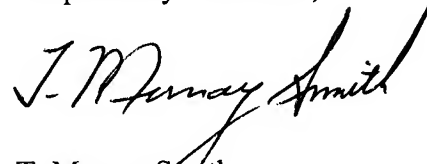
Based on the foregoing, it is respectfully submitted that all of the pending claims are fully allowable, and favorable reconsideration of this application is therefore respectfully requested. If the Examiner believes that examination of the present application may be advanced in any way by a telephone conference, the Examiner is invited to telephone the undersigned attorney at 972-739-8647.

Appl. No. 10/688,045
Reply to Office Action of June 8, 2007

Attorney Docket No. 2003-0065 / 24061.508
Customer No. 42717

Although Applicants believe that no fee is due in association with the filing of this Response, the Commissioner is hereby authorized to charge any additional fee required by this paper, or to credit any overpayment, to Deposit Account No. 08-1394 of Haynes and Boone LLP

Respectfully submitted,

A handwritten signature in black ink, appearing to read "T. Murray Smith". The signature is fluid and cursive, with a large, sweeping "S" at the end.

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Date: July 23, 2007

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Enclosures: Copy of PTO Memo dated May 3, 2007 (2 pages)

R-170564.1



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COMMISSIONER FOR PATENTS
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MEMORANDUM

DATE: May 3, 2007

TO: Technology Center Directors

FROM: *Margaret A. Focarino*
Margaret A. Focarino
Deputy Commissioner
for Patent Operations

SUBJECT: Supreme Court decision on *KSR Int'l. Co., v. Teleflex, Inc.*

The Supreme Court has issued its opinion in *KSR*, regarding the issue of obviousness under 35 U.S.C. § 103(a) when the claim recites a combination of elements of the prior art. *KSR Int'l Co. v. Teleflex, Inc.*, No 04-1350 (U.S. Apr. 30, 2007). A copy of the decision is available at <http://www.supremecourtus.gov/opinions/06pdf/04-1350.pdf>. The Office is studying the opinion and will issue guidance to the patent examining corps in view of the *KSR* decision in the near future. Until the guidance is issued, the following points should be noted:

- (1) The Court reaffirmed the *Graham* factors in the determination of obviousness under 35 U.S.C. § 103(a). The four factual inquiries under *Graham* are:
- (a) determining the scope and contents of the prior art;
 - (b) ascertaining the differences between the prior art and the claims in issue;
 - (c) resolving the level of ordinary skill in the pertinent art; and
 - (d) evaluating evidence of secondary consideration.

Graham v. John Deere, 383 U.S. 1, 17-18, 148 USPQ 459, 467 (1966).

- (2) The Court did not totally reject the use of "teaching, suggestion, or motivation" as a factor in the obviousness analysis. Rather, the Court recognized that a showing of "teaching, suggestion, or motivation" to combine the prior art to meet the claimed subject matter could provide a helpful insight in determining whether the claimed subject matter is obvious under 35 U.S.C. § 103(a).

- (3) The Court rejected a rigid application of the "teaching, suggestion, or motivation" (TSM) test, which required a showing of some teaching, suggestion, or motivation in the prior art that would lead one of ordinary skill in the art to combine the prior art elements in the manner claimed in the application or patent before holding the claimed subject matter to be obvious.

(4) The Court noted that the analysis supporting a rejection under 35 U.S.C. § 103(a) should be made explicit, and that it was "important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the [prior art] elements" in the manner claimed. The Court specifically stated:

Often, it will be necessary . . . to look to interrelated teachings of multiple patents; the effects of demands known to the design community or present in the marketplace; and the background knowledge possessed by a person having ordinary skill in the art, all in order to determine whether there was an **apparent reason** to combine the known elements in the fashion claimed by the patent at issue. To facilitate review, this analysis **should be made explicit**.

KSR, slip op. at 14 (emphasis added).

Therefore, in formulating a rejection under 35 U.S.C. § 103(a) based upon a combination of prior art elements, it remains necessary to identify the reason why a person of ordinary skill in the art would have combined the prior art elements in the manner claimed.